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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/058,905	01/30/2002	Kiwamu Kase	ASAIN 0103	7229

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EXAMINER	
PAPPAS, PETER	
ART UNIT	**PAPER NUMBER**
2671	

DATE MAILED: 11/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/058,905	KASE ET AL.	
	Examiner	Art Unit	
	Peter-Anthony Pappas	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *30 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2002* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter. As an example of the unclear recitation in the Specification see page 2, which states: "However, because CSG stores the whole data of an object as an assembly of fine solid models, the data is heavy, so that when installing simulation means of software, enormous amount of data must be treated, thus resulting in a problem that even the use of a high speed computer would take much time for analysis."

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. The claims 3 and 4 are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kela (Hierarchical octree approximations for boundary representation-based geometric models) in combination with Shu et al. (U.S. Patent No. 6, 075, 538).

5. In regards to claim 1 Kela discloses:

A method of storing substantial data integrating shape and physical properties, characterized by comprising an external data input step for

(a) inputting external data consisting of boundary data of an object

- At the outset a bounding box for the solid is computed and for simplicity it will be assumed that the solid boundary is contained wholly in the interior of the bounding box. See page 3 and Figure 3.

(b) Octree division step for dividing, by Octree division, the external data into cubical cells which boundary surfaces are orthogonal to each other

- See Fig. 2 and Fig. 3, specifically "First subdivision."
- Not only is the octant recursively subdivided, but the solid is also recursively portioned within each octant. First in this discussion is an examination of the octant decomposition process that breaks an octant into eight octants. See page 2.
- The decomposition is achieved by bisecting pO (parent octant) with three mutually perpendicular planes parallel to the parent octant faces passing through the centroid of pO. See page 3 and Fig 2.
- Each of the two linear bisectors (oflB) of the six faces of the parent octant are interested individually with pofF_i. The segments of the bisectors are then

classified with respect to the solid. This is achieved by an orderly traversal of ofIB and by computing normals at the intersection points. See page 4 and Figs. 2, 4-5.

6. Kela fails to disclose storing the values of various physical properties for each of the cells.

7. Shu et al. discloses :

(c) cell data storage step for storing the values of various physical properties for each of the cells.

- The present invention relates generally to three dimensional volume visualization, and particularly to a new data structure and method and system which significantly reduces computational time and space in displaying surface structure of a three dimensional object. See column 1, lines 7-11.
- The volume data is partitioned into NxNxN identical cubes, called cells, having 6 faces and 8 voxels or vertices, each voxel being associated with the physical characteristic, e.g. density, of the 3-dimensional object. See column 1, lines 25-29.

8. It would have been well known to one skilled in the art, at the time of the applicant's invention, for the combination of that disclosed by both Kela and Shu et al., because Shu et al. utilizes that which was disclosed above by Kela. Shu et al. uses an octree in forming said new data structure and octree division for the deconstruction of an object. Thus, it would have been obvious, to one skilled in the art, to incorporate the

disclosure of Kela into Shu et al. because Shu et al. relies on that which was disclosed above by Kela.

9. In regards to claim 2 Kela discloses:

The method of storing substantial data integrating shape and physical properties according to claim 1, wherein said Octree division step, each of the divided cells is classified to internal cells located in the interior of the object and boundary surfaces.

- Not only is the octant recursively subdivided, but the solid is also recursively partitioned within each octant. The solid boundary (faces, edges and vertices) contained within each NIO (neither inside nor outside) octant (i.e. boundary cell) is partitioned into the eight predecessors through simple geometric operations such as bounding box check, edge/face intersection and edge classification. See pages 1-2.
- See Fig 4.

10. In regards to claim 3 Kela discloses:

The method of storing substantial data integrating shape and physical properties according to claim 2, wherein said boundary cells is re-divided by the Octree division until acquiring cut points enough to enable the reconstruction of boundary shape elements including the boundary surfaces included in the external data.

- The rationale provided in the rejection of claim 2 is incorporated herein.

11. It would have been well known to one skilled in the art, at the time of the applicant's invention, to employ the use of boundary cells, found through Octree division, for the purpose of constructing a desired object, which has been enclosed in said bounding box as disclosed above. In the Specification applicant discloses on page 3 "Each boundary cell can be strictly or approximately replaced by cut points." Thus, it would have been obvious, to one skilled in the art, to use cut points and/or boundary cells as they can be substituted for another as previously disclosed.

12. In regards to claim 4:

The method of storing substantial data integrating shape and physical properties according to claim 2, wherein said internal call has one kind of physical property as its attribute, and the boundary cell has two kinds of physical property values of the interior and the outside of the object.

13. Kela fails to disclose that an internal cell has one kind of physical property as its attribute, and the boundary cell has two kinds of physical property values of the interior and the outside of the object.

- The volume data is partitioned into NxNxN identical cubes, called cells, having 6 faces and 8 voxels or vertices, each voxel being associated with the physical characteristic, e.g. density, of the 3-dimensional object. See column 1, lines 25-29.
- Furthermore, although the description below will make frequent references to density values as comprising the volume set, it should be understood that values

associated with physical characteristics of a 3-dimensional object other than density can also be used to define the volume data set. See column 6, lines 8-13.

- Said volume data comprising NxNxN cells, each having 8 voxels, each voxel representing a value of at least one physical property associated with the three dimensional body. See column 17, lines 52-58.

14. It would have been well known to one skilled in the art, at the time of the applicant's invention, that an internal cell derived from octree division would be surrounded by other internal cells, which are internal to the object in said bounding box. It would also have been well known that a boundary cell derived from octree division would be surrounded by two possibly different cells. One of these cells being an internal cell and the other an external cell. This boundary cell would thus encompass both internal and external elements of said object in said bounding box, as is disclosed by both Kela and by convention. Thus, it would have been obvious, to one skilled in the art, that should a cell (voxel, etc.) contain at least one kind of physical property it should also be allowed to contain two kinds physical property and would so do to the fact that the properties within said object, in said bounding box, might not always be those of like properties outside of said object, in said bounding box, when considering a boundary cell.

15. In regards to claim 5:

The method of storing substantial data integrating shape and physical properties according to claim 1, wherein said physical property values

consist of constant values which do not change by simulation, and variables which change as a result of simulation.

16. Kela fails to disclose said physical property values consist of constant values which do not change by simulation, and variables which change as a result of simulation.

17. It would have been well known to one skilled in the art, at the time of the applicant's invention, that for storing values of any kind said values would fall into one of two conventional groupings: constant (not able to be changed) values and variable (able to be changed) values. Thus, it would have been obvious, to assume that under any conventional conditions, such as simulation, constant values, would be unable to be changed. In addition, it would have been obvious to assume that under any conventional conditions, such as simulation, variable values, would be able to be changed, should the simulation be such that would bear relevance to the nature of said variable value so to warrant a change.

18. Furthermore, depending on the type of the simulation some physical characteristics can be either constant or variable. For example, the physical density of a block of ice will vary if the simulation is a change of temperature from 0°C to 100°C, but it will not vary (remain constant) if the simulation is one of a light change from one frequency to another (i.e. red to white).

19. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kela and Shu et al. as applied to claims 1-5, and further in view of Dundorf (U.S. Patent No. 5, 197, 013).

The method of storing substantial data integrating shape and physical properties according to claim 1, wherein the external data is:

(b) curved surface data for a three dimensional CAD or CG tool

20. Kela and Shu et al. fail to disclose external data that is curved surface data for a three dimensional CAD or CG tool.

21. Dundorf discloses:

- It is a further object of the present invention to provide a method of producing carved signs, wherein the method uses an integration of computer-aided design (CAD), computer-aided machining (CAM) and computerized numerical control (CNC) technology. See column 3, lines 41-47.
- It is an even further object of the present invention to provide a CAD/CAM system for producing carved signs embodying signage works having three-dimensional incised and/or relieved curved surfaces. See column 4, lines 9-12.
- Accordingly, the use of octree data structures, operations and algorithms can be used with the CPCS (computer-produced carved sign) design and manufacturing system hereof. See column 17, lines 35-37.

22. It is noted that for a CAD/CAM system to produce carved signs embodying signage works, having three-dimensional incised and/or relieved curved surfaces, that this information must be entered into said CAD/CAM system prior to the production of said carved signs.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Yamaguchi and T. L. Kunii disclose a means by which a border point is located, where the height of the object changes. This data is then used to generate other cutter paths.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter-Anthony Pappas whose telephone number is 703-305-8984. The examiner can normally be reached on M-F 9:00am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on 703-305-3885. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Peter-Anthony Pappas
Examiner
Art Unit 2671

PAP

JOSEPH MANCUSO
PRIMARY EXAMINER